



Information Technology Master Plan
FY 2016 through 2020

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Revision Control

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Introduction

At Montgomery College, student success is more than a phrase – it is a policy which states (in part):

Student success is the primary goal of Montgomery College. Achieving student success will be the driving force behind College planning, budgeting, and decision-making.

This policy is reinforced by the College's vision statement:

With a sense of urgency for the future, Montgomery College will be a national model of educational excellence, opportunity, and student success. Our organization will be characterized by agility and relevance as it meets the dynamic challenges facing our students and community.

Sense of urgency, national model, agility and relevance, meeting dynamic challenges: these words provide the motivation to use the latest information technologies to adopt a totally new approach to how the College should conduct its business in order to be fully and intensely focused on the success of our students.

Additional motivation comes from the impact of rising costs, and growing constraints on state and county financial support. Total student loan debt in America exceeds 1.2 trillion dollars¹, an amount greater than total credit card debt. Despite the benefits of a college degree, this level of indebtedness is creating an unsustainable burden for many students laboring to meet their repayment obligations. The reasons for increasing costs are not always within our control. But for the cost elements that we can address, the leadership of the College has an obligation to consider transformational, even radical, changes to our operating and service delivery methods.

But to truly ensure student success, a strong foundation of **institutional success** is first required.

Institutional success in the context of student success means that the usual support systems of higher education become so tightly and seamlessly integrated into day to day operations, and so easy to use, that they become invisible while being indispensable – and therefore no longer perceived as being a barrier to achieving the core mission of the College. Achieving this level of operational excellence will require effective management, communications, change management, diplomacy, and trust building.

At the same time, the organization charged with implementing these support systems must commit itself to support the College as it redesigns students' educational experiences and reinvents institutional roles – a process which will require a commitment to collaboration and cooperation within the College, and building and maintaining partnerships with the broader community.

This **Information Technology Master Plan** outlines a technology-enabled path forward to realize its single theme of achieving institutional success on behalf of our students.

¹ <https://studentaid.ed.gov/sa/sites/default/files/fsawg/datacenter/library/PortfolioSummary.xls>

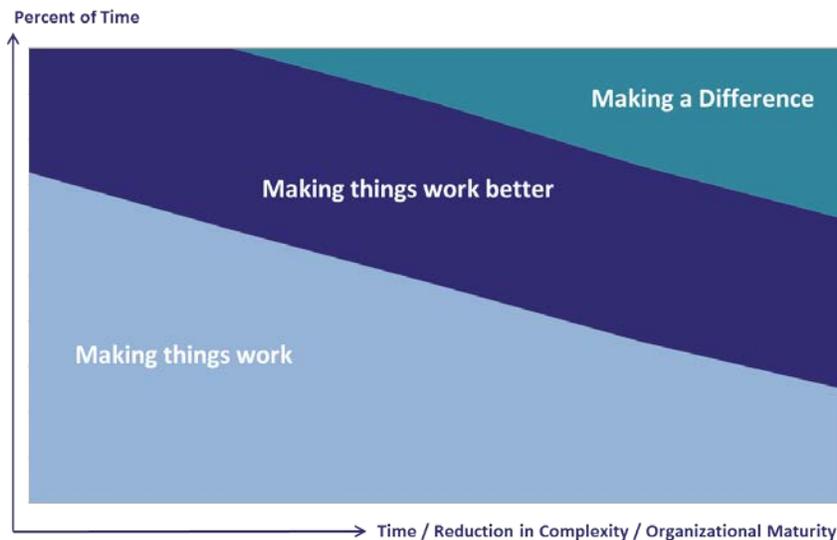
Mission, Vision, Principles, and Values

MISSION

The mission of the Office of Information Technology (OIT) is to enable student and institutional success. We seek to advance the work of others at the College by providing innovative technology solutions for instructional, administrative, outreach, and social purposes in harmony with the shared values of the College community. OIT strives to act as a careful and thoughtful steward of significant institutional resources, providing access to knowledge for individuals to use to transform society as well as themselves.

VISION

Our aspirations are illustrated by the graphic below. Traditionally, technology support services have been focused on the fundamentals of *making things work*. As technology evolved over time and our methods and organizational structures matured, it became possible to devote more effort to *making things work better*. But now, we look to the future. We aspire to become an organization capable of moving beyond making things work better to reach the stage when *making a difference* most accurately describes our purpose and accomplishments.



To that end, OIT is organizing our people and our processes to ensure that support and services are agile and responsive in an ever-changing technology environment. Our organizational structure and actions will be guided and informed through:

- Alignment with the College mission to create a sense of urgency for the future, emphasizing the need to adopt a more agile and flexible approach to providing information technology (IT) services
- Commitment to collaboration in order to optimize the use of technology in teaching and learning

- Provisioning transformational technology using cloud-based solutions in order to leverage resources, increase productivity, and create efficiencies

By 2020, the College will provide a secure technology environment that will enable students, faculty, and staff to meet their individual information needs using tools and methods of their own choosing at a sustainable cost. It will be possible to work anywhere, anytime, and on any device with the same level of access to all of the same resources.

OIT as a support organization will be less focused on hardware infrastructure and more focused on services. The time required to realize the benefits of new IT projects will be shortened significantly through the use of cloud-based applications. Maintaining a reliable and high-capacity campus data network will be even more critical, as College computing services and telecommunications will rely primarily on access to Internet-based cloud resources.

OIT staff will continue to lead the College in providing technology support and access to information. But in the future, the emphasis will be on innovation and consultation rather than tools and techniques. Harnessing the transformative power of technology to enable student success and institutional achievement – *making a difference* – will be our collective goal.

PRINCIPLES

Decisions about new IT initiatives, service offerings, and priorities will be made within a framework supported by the following principles:

- Reduce or constrain the cost of providing IT services to ensure fiscal sustainability
- Streamline processes and procedures to deliver results sooner
- Reduce effort spent on maintaining commodity services to which no special value is added
- Embrace changing technology as an exciting challenge and enabler of our mission, while maintaining perspective on what is truly useful rather than on what is simply new
- Leverage technology to assist members of our community having special needs
- Give priority to projects with clearly defined benefits for student learning and faculty development
- Communicate with care and clarity to keep the College informed about our services and challenges
- Invest in our employees – help them gain the skills needed to keep pace with changing technology and to realize their full potential to create value for all members of the College community
- Exceed expectations!

VALUES

We share our values with those already expressed for the College as a whole – Excellence, Integrity, Innovation, Diversity, Stewardship, Sustainability – and choose to add **Service**.

Planning Context

The Montgomery College 2020 Strategic Plan (MC 2020) is a powerful statement of our collective aspirations and motivations as a community of teachers and learners. It establishes the framework within which the most recent Academic, Libraries, and Facilities Master Plans find their expression. This IT Master Plan completes the institutional planning process by adding the necessary technology elements to the narrative.

The rapidly changing nature of technology and the dynamic environment of higher education argue for an IT plan that is continuously reviewed for relevance, fiscal appropriateness, and alignment with evolving College needs. This plan is therefore intended to be a living document that continually draws upon the College's planning processes, emerging technologies, key trends in higher education and industry, and ongoing analysis of institutional challenges and opportunities.

ENVIRONMENT

Montgomery College celebrates its seventieth anniversary in 2016. Faculty and staff have been challenged to embrace radical inclusion to ensure equitable outcomes for all students. "To set about this purpose, we must upend our institution to profoundly change how we think and act."² Technology can play a pivotal role in achieving this outcome, positively impacting student success metrics such as persistence, completion rates, and career outcomes through use of early-warning systems, enhanced advising and degree planning, and predictive analytic tools.

But, a piecemeal and uncoordinated approach is too often the source of disappointing outcomes, as noted in a recent report by the Education Advisory Board:³

While academic and administrative leaders have invested heavily in new support staff, programs, and technology solutions to improve student progress, IT usually becomes involved only after critical decisions have already been made, and then IT is asked to install and maintain solutions that other campus units have purchased. This leads to a painful paradox for CIOs and their teams: although they spend an increasing share of their time and resources integrating and implementing disparate systems and tools to support student progress, student outcomes have remained stubbornly stagnant across the last decade.

There are clear benefits to IT investing more strategically in student success – even though student success might not be considered a traditional IT issue because many of the critical decisions that affect student success take place outside the purview of most CIOs (e.g., curricular policy, faculty-to-student ratios, advising structures) ...

² February 8, 2016 budget request transmission letter from Dr. DeRionne Pollard to The Honorable Isiah Leggett and The Honorable Nancy Floreen, p. 2.

³ Optimizing IT's Role in Student Success, Rightsizing Support and Promoting Accountability, *EAB IT Forum*, October 7, 2016, p. 6.

At the same time, IT has invested in business intelligence and analytics staff, many of whom are dedicated to student success, and whose expertise is used to support broken processes and to respond to ad hoc data requests, rather than focusing on analysis that can support larger institutional initiatives ...

IT has broader insight into unit business processes than any organization on campus, which ideally positions it to help streamline and improve student service delivery, as well as delivery of decision support data.

HIGHER EDUCATION IT

EDUCAUSE, the higher education association for information technology professionals, conducts an annual survey of the top-ten IT-related issues in terms of strategic importance to the institution. In 2016, higher education IT organizations are *divesting* themselves of technologies that can be sourced elsewhere and of practices that have become inefficient and are *reinvesting* to develop the necessary capabilities and resources to use information technology to achieve competitive institutional *differentiation* in student success, affordability, and teaching and research excellence.⁴ The complete list for 2016 includes:

- 1) Information Security
- 2) Optimizing Educational Technology
- 3) Student Success Technologies
- 4) IT Workforce Hiring and Retention
- 5) Institutional Data Management
- 6) IT Funding Models
- 7) Business Intelligence and Analytics
- 8) Enterprise Application Integrations
- 9) IT Organizational Development
- 10) E-Learning and Online Education

These issues currently dominate the professional dialogue in higher education IT circles, and naturally are of concern to Montgomery College. Each will be addressed throughout the text of this plan.

CHANGE AND CONTROL

Change is a defining characteristic of the information technology profession. It is constant, difficult to manage, hard to predict, and often disruptive. Managing increasingly rapid change and the opportunities it presents is today's most challenging IT task.

⁴ Susan Grajek, "Top 10 IT Issues, 2016: Divest, Reinvest, and Differentiate," *EDUCAUSE Review*, vol. 51, no. 1 (January/February 2016), pp. 10-63.

We live at a moment in time when the generation first exposed to commercial "data processing" (DP) technology, based on room-filling mainframe computers, is passing away⁵. Some of the drivers of change since that first cohort of IT professionals used cumbersome processes to program slow computers (by today's standards) remain the same: individual creativity, hardware advances, market demand, declining costs, and rising expectations. But others are new: consumerization of technology, ubiquitous networking, mobile computing, social and entertainment applications.

To understand the motivators of changing technology trends, it can be useful to view change in terms of the distribution of power and resources within the ever-expanding community of technology users.

The first mainframe computers were owned only by the largest organizations in possession of the very substantial resources needed to house and operate the machines for scientific and business applications. The control exercised by these early DP shops was understandable, but also quite limiting. Knowledge of how the systems worked was available only to a relative few, and access was extremely limited. In political "us versus them" terms, the mainframe was "them."

Appreciation for the work performed by these machines naturally led others to pursue alternatives, and a competitive marketplace of vendors emerged to develop lower cost and easier to maintain systems capable of addressing the needs of smaller customers and specialized industries. The minicomputer delivered value to a new generation of customers, often located outside of the sphere of influence of the central mainframe support organization. The frame of reference had shifted to "us."

The momentum of Moore's law⁶ meant that it would not be long before a much smaller and more powerful computing force would emerge in the form of the personal computer (PC). And soon, every grocery store newsstand was filled with magazines exposing the technology in popular terms for all to understand and exploit. The "me" generation of computing had arrived.

The utility of personal computing devices was vastly enhanced as networking technologies became standardized and widely deployed, leading first to local area networks, and eventually to the Internet and cellular networks. This gathering together of independent devices through networking technologies signaled a return to "us."

The resulting redistribution of computing resources throughout all aspects of business, and now our personal lives, has transformed society. In so doing, it has created a host of management and resource challenges which are particularly complex in higher education because of the diversity of "customers" and expectations present on today's college and university campuses.

The widespread availability of affordable high-capacity Internet connectivity, coupled with broad adoption of other enabling technologies, has brought the evolution of technology change full circle to what can be thought of as a mainframe in "the cloud." IT services are now delivered over the Internet from a remote

⁵ 1951, UNIVAC, first American computer marketed for commercial business applications.

⁶ The number of transistors on a computer's integrated circuit chip will double every two years.

hosting center to subscribers who use a variety of devices to access the services. Computer processing and data storage are once again centrally located and managed – but rather than being standalone and locally housed, they are distant and simultaneously distributed throughout the Internet cloud.

Using the cloud requires that we relinquish a measure of control to the new “them” – but the democratization of technology has forever changed the nature of IT politics. A return to the monolithic environment of the mainframe era is not in the forecast, even though the recentralization of technology within the cloud has brought us back to our beginnings.

INFLECTION POINT

In differential calculus, an inflection point is the point on a curve at which a change in the direction of curvature occurs.

This idea has been reinterpreted by one of the founders of the Intel Corporation, Andy Grove, in this way:

*A strategic inflection point is a time in the life of business when its fundamentals are about to change. That change can mean an opportunity to rise to new heights. But it may just as likely signal the beginning of the end.*⁷

A recent article in *Trusteeship*, the magazine of the Association of Governing Boards of Universities and Colleges, discussed the notion that information technology in higher education has reached an inflection point – “the point at which the trends that have dominated discussions among leading strategists and that have motivated ‘early adopters’ of various technologies are now cascading into the mainstream of institutions. For example, cloud computing ... is now incorporated into campus IT strategy or is exerting a major influence over emerging strategy at more than 60 percent of colleges and universities. The same is true of business process redesign, as institutions have begun to adapt institutional processes to software requirements instead of the reverse, which had been the common – and costly – practice for decades.”⁸

Cloud computing and redesigning business processes around software capabilities are examples of fundamental changes in strategy that will have a profound impact on how colleges and universities organize the delivery of IT services.

At Montgomery College, OIT has adopted this viewpoint, and is pursuing a **cloud first** approach to guide future investments in technology and personnel. Moving to the cloud is the overarching strategy supporting the four foundational elements of the IT master plan described in this document.

By 2020, OIT’s goal is for all of the College’s information systems to be based on state-of-the-art cloud solutions, with on-site data center operations limited to providing just the infrastructure needed to maintain the College’s data and voice networks. This transition to the cloud will alter the relationship of OIT to the rest of the College, causing it to be more of a consultancy than a technical support

⁷ Andrew S. Grove, *Only the Paranoid Survive*, 1996.

⁸ Susan Grajek, “What Boards Need to Know about Technology in 2015,” *Trusteeship Magazine*, Special Issue 2015.

organization. The roles of OIT staff and functional area staff will blend and reinforce one another. OIT will be a smaller, more agile, more cost-effective organization – focused intensely on student success and institutional service.

Organization

The Office of Information Technology reports to the senior vice president for administrative and fiscal services. It is organized into five major units and is led by the vice president of instructional and information technology and chief information officer (CIO). Guidance regarding day-to-day operations and policy is provided by the Senior Administrative Leadership Team, the President’s Executive Cabinet, and the thirteen governance councils.

CAMPUS MANAGEMENT SERVICES

Campus Management Services (CMS) comprises OIT’s campus-facing service operations responsible for providing in-person and remote technology support to students, faculty, staff, and administrators at all College locations and community engagement centers. In addition, the team is responsible for supporting classroom instruction and, in conjunction with the Office of E-Learning, Innovation, and Teaching Excellence, all technology used by faculty, with a special emphasis on promoting awareness of innovative technologies and services available through OIT for the advancement of teaching, learning, and research.

CMS works closely with campus provosts, administrators, deans, directors, department chairs and program managers to identify and plan for the implementation of new and emerging technologies that support student success. The CMS team is led by a Deputy CIO, and includes an instructional technology director, an IT service desk manager, four campus-based IT managers, an endpoint systems manager and 40+ IT support specialists.

The CMS team provides front-line technical support for all technology at the College, including equipment installed in offices, classrooms, labs, learning centers, welcome centers, community engagement centers, libraries, conference rooms, and specialized facilities such as Globe Hall, Theater Arts and the Bioscience Education conference center. The team also provides special technical support for meetings of the Board of Trustees, collegewide meetings, and other special events. CMS team leaders routinely collaborate with academic leadership in piloting emerging instructional technologies, and work closely with Facilities Services to plan for technology implementation in new construction and building renovations.

PERFORMANCE MANAGEMENT SERVICES

Performance Management Services is responsible for leading OIT long-term planning efforts; security, privacy, and cybersecurity compliance; contract, asset and project management; budget and accounting services; relationships with other county agency technology units; and special projects. The team evaluates and responds to all requests for commodity hardware and software technology products.

Performance management is responsible for data-driven reporting on OIT activities based on real-time performance measures provided by all OIT teams.

INFORMATION SERVICES

Information Services is responsible for providing technical support for all enterprise and departmental computer applications and technologies, including the College website, the MyMC portal, and multiple web applications. Information Services focuses on how technology can best be utilized to serve the information needs of the College community. As a result, the team works collaboratively with all stakeholders to help identify needs, requirements, and appropriate solutions.

Information Services focuses on five main areas:

- Development and Integration creates interfaces between the ERP system and third party applications
- Enterprise Applications provides technical support focused on ERP and web-based systems
- Quality Assurance tests, validates and ensures reliable delivery of services across all systems
- Reporting and Data Warehouse provides analytics for College users to make data driven decisions
- Web Applications supports the web platform used by the College website and application portal

In line with OIT's cloud first strategy, Information Services will be working over the next three to five years to move most critical applications to cloud-based solutions. As a result of this changing technological landscape, the Information Services team will be working to evolve staff roles from a traditional development mindset to a technology consultancy and advocacy practice.

Part of this new focus involves partnering with students, faculty, and staff to more effectively utilize the technology that is provided by OIT. As partners in technology, the team will continue to provide coordinated and seamless technology services, while improving outreach efforts in order to enhance business processes, inspire innovation, and support students as they work to achieve their educational goals.

INFRASTRUCTURE AND ENGINEERING SERVICES

Infrastructure and Engineering Services is responsible for the College's IT enterprise architecture, and provides for the design, implementation, support, and maintenance of all technology infrastructure. The team's responsibilities include enterprise architecture, server and storage systems, collegewide data and voice networking, data center operations, the network operations center, application and cloud computing infrastructure, facilities security systems, and College IT facilities planning.

Over the next five years, Infrastructure and Engineering Services will update and enhance the College network, improve power reliability to network devices, update and expand wireless capabilities (including outdoor wireless), help to migrate data center hosted application resources to the cloud, fully transition the College wide-area network to FiberNet, provide reliable and resilient computing resources and

capabilities in the cloud to support the College's application needs in an agile and cost-effective manner, and implement core IT infrastructure in new and renovated buildings.

BUSINESS PROCESS INNOVATION

The Business Process Innovation (BPI) group is focused on aligning all systems to promote business effectiveness and efficiency while striving for innovation, flexibility, and maximizing the value gained from the use of technology in the workplace. The team works with stakeholders throughout all College departments to create innovative, flexible and effective business processes, and recommends and implements changes that align administrative operations with the needs and ideas of students, employees, vendors, and other constituent groups.

This group is responsible for managing the College records management policy and procedures, including ensuring compliance with national, state and local laws and regulations.

In addition, BPI oversees the development and delivery of a technology training program for College employees related to the use of business and administrative software in the workplace.

The primary current responsibility of the team is to manage the multi-year project to replace the Banner ERP system with Workday and other solutions that are to be determined.

Foundation – Optimized Infrastructure

EVOLUTION OF HIGHER EDUCATION ENTERPRISE IT

The business functions of the College exist to enable the academic success of our faculty and students, and to enhance their individual experiences as members of the Montgomery College community. Many interrelated systems and procedures work together to make this possible. The most important of these is known as an Enterprise Resource Planning (ERP) system.

An ERP system typically provides functions such as human resources, payroll, finance, and procurement. Additionally, college and university ERP systems may also offer student information system (SIS) functionality in areas such as admissions, registration, financial aid, curriculum planning, and advising. The ERP system is traditionally considered to be an organization's "system of record" – the single authoritative source of the facts and figures that describe the transactions of the business.

But a transition is underway toward the creation of a "system of engagement" – an interactive, collaborative, graphical and visual environment that integrates information from multiple sources and is actively used by a community of people, not just passively attended to by a relative few.

Systems of engagement are different from the traditional systems of record that log transactions and keep the financial accounting in order: They focus on people, not processes. Instead of screen scraping the hotel reservation system and calling it a mobile app, a system of engagement

presented on a smartphone will know that a guest has entered the lobby for the first time and probably wants to check in. And by using GPS or location context directly from the device, the "system" will know that when you enter your room, the app should default to the concierge and room service tabs, thus providing immediate access to these hospitality services.

These new systems harness a perfect storm of mobile, social, cloud, and big data innovation to deliver apps and smart products directly in the context of the daily lives and real-time workflows of customers, partners, and employees. The compelling notion of context – the sum total of what your customer has told you and is experiencing at the moment of engagement – is made possible with cloud delivery and predictive analytics applied to a blend of data from device sensors, social feeds, personal preferences, and systems of record.⁹

The phrase "system of engagement" was first used by author Geoffrey Moore to describe his vision of the future of enterprise IT. He views the impact that consumer-originated technologies are having on large business enterprises as being the driving force moving us away from our old systems of record.

*What some are calling the consumerization of enterprise IT is not some sop thrown to the millennial generation swelling our work forces but rather a next wave of productivity gains to be garnered from investing in a next wave of IT. Only this time around, instead of investing in automating first level task workers at the edge of the enterprise with various transaction processing applications, and instead of informing executives at the top of the enterprise with various business intelligence applications, the focus instead will be on empowering the **middle** of the enterprise to communicate and collaborate across business boundaries, global time zones, and language and culture barriers, using next-generation IT applications and infrastructure adapted from the consumer space. What will enable this transformation are **Systems of Engagement** that will overlay and complement our deep investments in systems of record.¹⁰*

Moore describes a system of engagement as overlaying and complementing a system of record. But what if an entirely new system could be created that combined both approaches?

BANNER – SYSTEM OF RECORD

The College's current ERP system, Ellucian Banner, was first implemented between 1996 and 1998. It is based on outmoded technology, is very costly to maintain, and falls far short of meeting contemporary needs. Like other systems of its time, it requires on-site hardware in a data center environment to operate, and staff expertise to maintain. The Gartner technology research service describes today's situation as follows:

Many SISs in place today are old implementations of aged technologies that only support traditional students and business models. To address changing business requirements over the

⁹ Ted Schadler, "A Billion Smartphones Require New Systems Of Engagement," Forrester Research, Inc., February 14, 2012.

¹⁰ Geoffrey Moore, "Systems of Engagement and The Future of Enterprise IT: A Sea Change in Enterprise IT," AIIM White Paper, 2011.

years, the SISs installed on the campus have often undergone continual customization. They are routinely augmented with a plethora of bolted-on modules, either developed in-house, from the SIS vendor itself or from third-party providers. The resulting architecture is one that is now often described as complex, brittle and difficult to maintain. Unable to respond to mounting requests for change, many higher education CIOs are under fire for what is perceived by their campus as a lethargic response to very dynamic circumstances. CIOs report their SISs are increasingly expensive to maintain, while simultaneously a growing disappointment to the key user constituencies of faculty and students. Meanwhile, legacy SIS vendors have been slow to evolve SIS technology platforms, introduce support for new higher education business models (e.g., competency based education) and provide the many functional enhancements demanded by students and faculty.¹¹

Banner has never reached its full potential at the College, in part because of a cumbersome user interface and technical design, and in part due to the difficulty of implementing the typical ERP systems of its time in a large organization.

Limitations in the software have prompted the College to acquire multiple products from other vendors to extend Banner's functionality, or to make up for features it lacks. This has resulted in multiple user interfaces, integration challenges, and spiraling licensing and support costs. The lack of integration of these various systems has prevented them from fully meeting College expectations and needs, and greatly increased costs. Examples include Taleo, Benelogic, ImageNow, and Starfish.

The technology of Banner itself, as well as its underlying database and systems purchased from other vendors, requires employees throughout the College to have technical knowledge of Banner's configuration and operational requirements. This product-specific knowledge is often lacking or vested in one person, and is compensated for by the use of external contractors. Over the years, the College has become operationally dependent on the use of these contractors, at considerable annual expense. This approach is not sustainable, and it places the College at risk as employees retire or change jobs.

Customizations made to the software over the years to meet special requirements have made migrating to new versions difficult and time-consuming. As a consequence, the College is not using the current version of Banner, or all of its features. In order to become current, the College would need to complete a time-consuming and costly upgrade to the most recent version – and even then, the objective of moving to a cloud environment would not be achieved and the existing challenges would still exist. Responding to market pressure and customer demand for software as a service (SaaS) applications, Ellucian has indicated that it will be developing an entirely new cloud-based system. But to implement this system (when available) would mean yet another system conversion.

Ellucian and its customers face a challenging future. The company has recently changed ownership multiple times and undergone significant changes in leadership. It markets three entirely different and competing ERP systems that it needs to bring into harmony, and it is faced with substantial competition

¹¹ Terri-Lynn B. Thayer, Kelly J. Calhoun, and Manav Sachdeva, "Market Guide for Higher Education Student Information Systems," Gartner Inc., March 26, 2015.

from other vendors. Its focus is diluted by the need to maintain multiple legacy products while attempting to replace them with something entirely new.

In response to this state of affairs, and as part of its cloud first strategy, OIT proposes to replace Banner as rapidly as possible to improve the experience of our students, faculty, and staff, and to enhance administrative efficiencies and reduce costs. Of special importance, the process itself of replacing Banner is intended to create the opportunity to redesign and improve how work is accomplished, and to promote the adoption of best practice business processes and workflow operations.

Gartner has identified several outcomes sought by higher education institutions when implementing a new ERP system:

- Flexible, rule-based configurable solutions with extensive self-service features that reduce the number of customizations and departmental shadow systems
- Functional support for continuing education and nontraditional programs, such as competency-based education, in order to address the changing needs of learners
- Mobile and social-enhanced solutions for students, faculty and administrators
- Support for real-time analysis of data to enable more efficient operations and to strategically support the transformation of the institution through use of advanced analytics (e.g., to offer the right programs and align faculty and other resources accordingly)
- Less disruptive implementation processes, with less upfront investment
- A modular system that leverages existing and emerging integration standards
- The ability to reallocate campus IT staff and resources to more strategic initiatives

SOFTWARE AS A SERVICE (SAAS)

The software as a service model of cloud computing has altered forever the way traditional information technology organizations (like OIT) operate. In the SaaS model, there is no software to install, no hardware to buy, no software patches to be applied, no data backups to be made, no disaster recovery plans to maintain. The software application is delivered by subscription as a service that is provided to customers using the Internet and web technologies.

When Banner was first sold in the mid-1980s, customers were required to have considerable technical skill and on-site computing resources to install and maintain the system. Using the cloud model, customers no longer need any on-site computing equipment, and there is a greater need for functional area knowledge rather than technical skill.

The direction of the higher education software industry reflects the trend seen in the broader IT industry. The latest solutions are being developed using newly designed cloud technologies and delivered to customers as a service. The need to invest in local computing facilities and technical talent is shifting to a model that is business process driven and less IT-centric.

With these considerations in mind, on April 20, 2016, College President DeRionne Pollard announced the selection of a new technology system in a collegewide memorandum in which she summarized the motivation for making a change and its expected outcomes.

In my recent State of the College address, I spoke about the role new technologies will play in helping the College improve efficiencies, and more effectively “spend for student success.” By rethinking our common work processes and utilizing contemporary software, the College can generate significant savings of both time and financial resources.

*To this end, a new technology system for human capital and financial management services has been selected. **Workday**, a leading provider of enterprise cloud applications for finance and human resources, will replace portions of the 22-year-old, existing enterprise resource planning (ERP) applications now in use. A modern “software as a service” solution, Workday will begin driving MC business processes in the functional areas of human capital management, payroll, and financial management in 2017.*

This change was decided upon after an internal analysis of MC’s systems and an external review of industry best standards for modern technology ERP applications. The cost of maintaining the existing technology is increasingly prohibitive and Workday is expected to improve MC’s processes while creating workplace efficiencies, in keeping with our approach to spend for student success. The selection of a vendor for the remaining ERP functions that directly impact students will be the result of a collegewide evaluation process which will take place during the fall semester.

Founded in 2005, Workday has grown rapidly in response to the broad adoption of cloud solutions by the world’s largest companies, educational institutions, and government agencies. Workday’s customer list—which includes the State of Maryland, University of Maryland University College, Georgetown University, and corporations such as Google, Facebook, Netflix, and Bank of America—is a testament to its vision and innovation...

The College’s movement to Workday is one of our first major steps in leveraging technology to gain more efficiency. Freeing people to do the work of student success that only people can do is one of the major benefits of this change. Moving to the next generation of cloud-based systems will enable us to work smarter, focus on student achievement, and spend for success.

WORKDAY – SYSTEM OF ENGAGEMENT

Workday is a modern ERP system created from a “clean slate” and developed from the start using the latest cloud technologies. Workday is the first provider of finance and human resources software for education to deliver its solutions in the cloud using a multi-tenant SaaS model.¹²

¹² Vicki Tambellini and Mary Beth Cahill, “TTG Vendor Review: Workday in Higher Education,” The Tambellini Group, April 2015.

Workday provides enterprise applications for human capital management (HCM), payroll, financial management, student records, and analytics. As a multitenant, software as a service system, it is an example of the type of platform OIT is seeking to realize its strategic direction of moving fully to the cloud. Multitenancy uses one instance of a software application to serve the needs of multiple organizations (“tenants”). It allows for cost savings when compared with single-tenant, hosted, or hybrid options, and ensures every customer is on the same version of the software, enabling faster innovation and easier upgrades.

Reinventing the HCM/Payroll/Financials market from scratch using the latest web-inspired technologies, Workday has become the leader in bringing to market a SaaS solution for multiple industries in these application areas. According to a Gartner analysis, “Workday has the most mature core HR application and the largest number of customers in production, and leads the two competitors evaluated here (Oracle and SAP) in customer satisfaction.”¹³

And, in an October 2014 evaluation of eight SaaS HCM systems by Forrester Research, Workday earned the leader position in the evaluation, receiving the highest overall scores of the group in the core human resource management, compensation, strategy, and technology subcategories and among the highest scores in the SaaS and customer experience subcategories.¹⁴

By adding support for the needs of colleges and universities to manage student admissions, advising, registration, and financial aid functions, Workday has positioned itself to be the first cloud provider of a newly developed integrated ERP system for higher education. This is consistent with the company’s origins in higher education, as founder Dave Duffield demonstrated his affinity for the mission of colleges and universities when creating his prior companies, Integral, Information Associates, and PeopleSoft.

Distinctive Workday Characteristics

Workday’s most obvious distinction is that the software is delivered as a cloud service via a subscription model. The software itself is not licensed – rather, one or more components of the service are subscribed to for a fixed period. And, as a cloud offering, no College-owned hardware is required. Because Workday uses a multitenant deployment model, operating costs are reduced since multiple customers share available hardware resources.

Workday cannot be customized (changed). Instead, it is “configured” to meet customer specific requirements based on industry best practices. This makes it possible for there to be just one version of the software that is used by all customers. This greatly simplifies maintenance of the system, reduces costs for customers and Workday alike, and fosters a cohesive user community that can work together to improve the product and define its future.

¹³ Ron Hanscome and Yvette Cameron, “Seven Ways to Compare the Enterprise HCM Suite ‘Big Three,’” Gartner, Inc., May 6, 2015.

¹⁴ “The Forrester Wave™: SaaS HR Management Systems, Q4 2014,” Forrester Research, Inc., October 1, 2014.

Workday is implemented with a focus on business processes. Hundreds of best practice processes and predefined workflows are delivered with the system. By using the delivered business processes, implementation can be much quicker than with traditional systems. When necessary, the delivered processes can be changed or new processes created – but much of the value of the system will be realized by minimizing this activity. To configure Workday requires reviewing and understanding all of the College’s business processes. The implementation will create an opportunity to redesign and improve how work is accomplished, engaging everyone in a process to reimagine how their work can contribute to the College mission by enhancing operational efficiencies and minimizing risks.

Workday has comprehensive auditing built-in throughout all aspects of the system – an audit trail is maintained for *all* actions, and no data is ever deleted unless required for legal or compliance reasons.

A single security model is applied across all aspects of the product. There is no distinction between mobile, desktop, and programmatic access. This differs from the current situation, and means that it will be much easier to ensure that all users have access to the reports and data needed to fulfill their job responsibilities. The Workday company is regularly audited by independent third-parties for its security, confidentiality, availability, and privacy controls. Because of its investment in security, Workday is capable of providing greater assurance of the security of College data than the College itself.

Workday is designed first for use on mobile devices. All functions are intended to be usable on any size screen. There is one user experience, and it matches the expectations of anyone used to interacting with contemporary web applications like Google, Amazon, or Facebook. Compliance with accessibility requirements is maintained throughout the user experience – Workday is fully section 508 compliant.

All customers are upgraded to the latest version of the software simultaneously, with new features made available every six months. The upgrade process currently takes as little as four hours, compared with weeks or months when OIT updates Banner. In the future, upgrades will occur with no down time. This rapid cycle of delivering new functionality means that the user experience is always current, and always reflects the latest advances in technology and the business and social environment.

Workday makes use of in-memory processing. All data is stored in memory, so no costly third party database system is required to store transactions. This also makes possible the use of “built in” analytics on real time information, with drill down capability to reveal detailed underlying information. Graphical representation of information using dashboards and creative visualizations is standard and available to all users throughout the system. Unlike more traditional systems, Workday is able to use one source of data for all transaction processing, reporting and analytics – there is always only “one version of the truth” seen by all functions and users.

Workday is both a “system of record” and a “system of engagement.” It combines the capabilities of both system types into a unified user experience, going a step beyond the vision of Geoffrey Moore.

Cost and Savings

Banner and its related software products are expensive to operate and maintain. Retiring Banner provides OIT with its largest opportunity to reduce ongoing expenses – and to have a positive impact on the College’s operations.

Since the College purchased its perpetual license to use the software over 20 years ago, that expense is effectively amortized. But required annual maintenance payments continue. In addition, there is an annual expense to license the underlying Oracle database software used by Banner, and annual costs associated with maintaining other products which are either needed to augment Banner functionality, or used as part of its necessary infrastructure. When Banner is fully replaced, most of these expenses will be eliminated.

Moving from Banner to a cloud-based system establishes the foundation for reducing future staff requirements within OIT through attrition and reallocation. Personnel expenses in other offices may also represent an opportunity for potential savings, as use of the system matures and the benefits of self-service processes and increased automation accrue. And, due to the nature of how the software is designed and implemented, there should be relatively low ongoing consulting and contractor requirements after implementation is complete.

The simplified cost structure of a Workday solution means that, in time, the College can anticipate being able to reallocate and / or reduce the annual expenses associated with maintaining its ERP system. Funds currently used to support Banner and related systems will be redirected to pay for cloud system subscriptions. But, since there will be significant one-time costs associated with the implementation effort and to maintain dual systems during the conversion period, savings will not be realized immediately.

Process and Timetable

The first phase of Workday implementation for HCM/Payroll/Financials will be complete July 1, 2017. Other phases will follow, with new functions delivered at least every six months.

Having reached a decision to implement Workday for HCM/Payroll/Financials, the evaluation of student system vendors can begin. The next generation of student systems will start to become available for use in 2017, so the upcoming year provides time to prepare for the change and to reach a decision on a new student system while the HCM/Payroll/Financials project moves forward.

Replacing the student and advancement portions of Banner will be the subject of separate projects and selection processes. It is important to highlight that all Banner functions must be replaced in order to achieve maximum savings.

The student system components include recruiting, admissions, student records, financial aid, curriculum management, academic advising, and student financials. The selection of a vendor will be the result of collegewide consultation and input. An RFP will be issued to identify the solution best suited to the College’s requirements, with the expectation that a selection will be made by summer of 2017.

Selection of a new system for advancement can proceed in parallel with the student system selection, drawing as it does on resources generally not associated with the implementation of the other projects.

Project and change management will be critically important to the effort. An implementation partner has been hired to assist the College manage the project and prepare, equip and support our employees to successfully adopt change. OIT's own internal communications and project management staff will work in close coordination with the implementation partner to drive institutional success and project outcomes.

A change management methodology will be employed to ensure understanding, minimize risk, reduce resistance, and maximize results. As one example, the ADKAR® model is a goal-oriented change management framework that allows change management teams to focus their activities on specific business results. The five parts of ADKAR – awareness, desire, knowledge, ability and reinforcement – describe the milestones an individual must achieve for change to be successful.¹⁵ Training in the use of the new systems will also be essential, and will become part of the standard curriculum of OIT and the Center for Professional and Organizational Development.

Objectives Summary

New systems should use the latest multitenant cloud technology strategies, rather than just being “hosted” remotely. This will reduce ongoing costs, and enable OIT to realize its vision of greatly reducing data center operations, simplifying technical support requirements, and delivering maximum business value to the College. There should be less need to maintain third-party “add on” systems, reducing cost and improving the user experience. Reliability and security will be enhanced.

The opportunity to transform how the College does business through a top-to-bottom redesign of business processes, leading to more efficient operations; elimination of manual processes; improved user experience; greater student engagement; improved student service; mobile device access; support for data-driven decision making; ease of use; improved security; reduction in training requirements; improved analytics and simplified reporting; reduction in reliance on outside consultants to operate the business of the College; direct cost savings; risk mitigation; and finally, institutional success leading to student success.

DATA WAREHOUSE, REPORTING AND ANALYTICS

With the introduction of a new ERP system, OIT's existing approach to collegewide reporting and analytics needs to be reimagined.

Transaction-oriented systems like Banner are designed and optimized to store information about individual business events, rather than producing reports. And, not all information of interest is stored in Banner. In order to provide detailed analytics and to generate reports drawn from more than one source, OIT invested in a data warehouse and specialized reporting tool set called Blackboard Analytics.

¹⁵ <http://www.prosci.com/adkar/adkar-model>

On a regular basis, selected data from Banner is extracted, transformed, and loaded into the Blackboard Analytics platform. Information from other systems can be included as well. Typical business reports such as student lists, enrollment statistics, financial transactions and budget spreadsheets can be created using the software. To provide a deeper level of analysis, drill-down to detail capability, dashboards of key performance indicators, and business graphics, additional reporting tools such as QlikView are used.

The challenge with this approach is that the data used to create reports is one step removed from its original source and potentially out of date. To realize the goal of working with data that represents “one version of the truth,” knowledgeable staff from each office that is the steward of institutional data need to work together along with OIT staff to ensure the consistency and quality of data held in the system. The data model embodied in the warehouse software must accurately reflect campus business rules, data definitions and security controls.

The process of moving data among multiple systems is inefficient. The potential for error is significant. The data available for analysis is limited by choices made during the initial system design. And, knowledge and expertise in the use of multiple technologies is required.

The Workday system can be used to store information drawn from other sources. It provides rich reporting and analytic tools, one source of institutional data, and a single security model. The technology needed to provide sophisticated analytics and graphical representations of data is “built-in” to the system, and readily accessible to all authorized users.

As part of the implementation of Workday and the evaluation of candidates for a new student system, a thorough analysis of options to meet future reporting needs will be conducted. The outcome of this process will depend on the choice of student system, and may include the acquisition of new software tools and required staff training.

DOCUMENT MANAGEMENT

Workday is designed to be a paperless system, so the use of original printed documents will decline. Existing processes for electronically managing business documents are based on use of Banner and ImageNow. Paper documents can be scanned and stored in ImageNow and associated with identification information stored in Banner. The process is cumbersome, requires installation of special desktop PC software, and needs OIT support. In the future, documents associated with human resources, procurement, and finance will be stored directly in Workday without the need for an external third-party software product. The choice of student and advancement systems will determine how this functionality is provided in the student records and advancement environments.

Just as with reporting and analytics, a part of the implementation of Workday and the evaluation of candidates for a new student system will be an analysis of options to meet future document management needs. The disposition of existing documents stored in ImageNow will need to be determined and a conversion project initiated. Aspects of this analysis include examination of business and workflow processes throughout the College, and the potential for use of electronic signatures.

STORAGE

Related to document management is the storage of individually created items – Word documents, Excel spreadsheets, PowerPoint presentations, PDF files – that are currently saved on “shared drives” on the College local area network servers. Maintaining shared drives requires a significant investment in server hardware and staff skills, and an ever-expanding array of storage devices to meet a need that always seems to be growing. There is also demand to provide access to these types of files outside of the College network, and on multiple device types other than the traditional desktop PC.

Data originating from other sources – server backups, application data, security logs, network logs, legacy archival information, etc. – also needs a home. To fully implement the strategy of simplifying operations and improving reliability and service by moving to an entirely cloud-based environment, an alternate to shared drives and general purpose disk storage is needed.

Thousands of students, faculty and staff at the College already utilize personal cloud-based storage provided by vendors such as Dropbox, Box, Microsoft and others. These “early adopters” have demonstrated the demand for and utility of cloud storage – but potentially have exposed the College to risk by storing College business information in a context outside of our traditional controls, policies and procedures.

To address this situation, OIT has drafted a procedure to support policy 66002 “Confidential Data Management and Security.” The procedure will be brought to the President’s Executive Cabinet for review during spring 2017. An evaluation of College-sponsored options for cloud storage will be conducted, and the results used to better understand the role of the OneDrive storage option already available to College users of Microsoft Office 365, and how it compares to an OIT-sponsored pilot program using Dropbox for about 100 administrative users.

DATA CENTER OPERATIONS

OIT’s cloud first strategy calls for all of the College’s information systems to be based on cloud solutions by 2020. On-site data center operations will be limited to providing only essential data and voice network infrastructure. This approach means that the primary data center located on the Takoma Park / Silver Spring campus will be underutilized.

Because it is a very robust and high-quality facility having significant capacity to host a variety of computing equipment, OIT has offered space in the data center to other county agencies. It is expected that the Maryland National Park and Planning Commission and other agencies may commit to using portions of the facility. Other organizations may also have an interest, so OIT will evaluate options which could result in revenue generation through rental of space in the data center.

The College’s original data center located on the Rockville campus has been retrofitted to serve as a small-scale backup and disaster recovery site for the Takoma Park / Silver Spring facility. Although satisfactory for its current purpose, the movement of all applications to the cloud means that this location

will also be unneeded in the future, except for use as a point of presence (see below). The backup function served by this space will be moved to a cloud environment as soon as practical.

Cloud applications based on SaaS services include backup and disaster recovery capabilities as part of the service offering. For those applications implemented using an Infrastructure-as-a-Service (IaaS) model, OIT will shift its application backup and disaster recovery strategy to fully utilize the features of cloud services offering improved capabilities and more reliable access in the event of unforeseen hardware / software failures or a major disaster.

Although software-as-a-service is the preferred strategy for implementing applications, there will always be some situations when this model does not apply – for example, the College website. To address this situation, an evaluation of alternative cloud IaaS providers will be undertaken, with the expectation that one or two services will be selected as the preferred vendor. Well-known competitors in this space include Amazon Web Services, Microsoft Azure, and Rackspace.

NETWORK, WIRELESS AND INTERNET

As the provision of services moves out of the College-managed data centers and into the cloud, the need to maintain, continually enhance, and secure the College wired and wireless networks and Internet services becomes even more important. The network and associated services such as identity management have emerged as the most critical of the technologies provided by OIT.

The capacity and price of Internet access for the College has improved dramatically in recent years. Three independent Internet providers serve the College – one dedicated to each main campus, and all interconnected to ensure continuous operation in the event of an individual link failure. Recently the College became a full member of the Internet2 organization, which provides very high capacity (10 Gigabit) links to popular web destinations such as Google, Microsoft and Amazon, and connectivity to other major colleges and universities without using the commercial Internet backbone.

The College network is built using an extensive collection of multiple types of cabling and equipment distributed throughout all College locations and buildings. It includes hundreds of individual devices, thousands of connection ports, and well over one thousand wireless access points. It is complex, but highly reliable, and offers sufficient capacity to serve the College for years to come.

Within the individual campuses and remote locations, OIT manages the network infrastructure and maintains it in close coordination with Facilities. In order to interconnect the College's multiple locations and connect to Internet service providers, OIT has traditionally relied on commercial providers of networking services. This remains the case today, with most of the network traffic being transported by Level 3 Communications. The service provided by Level 3 is outstanding and competitively priced. However, OIT is committed to pursuing an alternative strategy.

FiberNet

FiberNet is a fiber-optic communications network constructed and managed by the Montgomery County government. It is the backbone infrastructure intended to enable delivery of communications services for all county agencies, including the College. It extends through 570 miles of fiber-optic cable and connects over 600 county facilities, including all College locations. The county recently launched an initiative to create a Network Operations Center (NOC) to provide network monitoring, response and repair services for FiberNet at levels comparable to commercial facilities. The NOC will enable FiberNet to evolve from a "best effort" service to a commercially reliable network that will support optical networking and next generation communication services. As a result of this service enhancement, OIT is committed to migrating to FiberNet as the College's primary network provider, and limiting use of commercial services to an emergency backup role where appropriate.

Under an existing Memorandum of Understanding with the county, FiberNet is obligated to provide dark fiber connections to College locations. Availability of fiber strands is limited at certain locations, so a pilot project to implement optical networking capability (dense wavelength-division multiplexing) as a possible alternative is underway.

Because FiberNet is funded by the county, making greater use of it for College communications provides an opportunity to reduce the ongoing cost associated with providing wide-area networking for the College's multiple locations. FiberNet's presence in the College's Takoma Park / Silver Spring data center also facilitates its use by other county agencies and potentially other organizations.

Wireless

The College wireless ("WiFi") network is generally well provisioned and architected to meet present and future needs, though it is constantly challenged to meet increasing user demands. However, wireless WiFi access in outdoor portions of the College is in need of improvement. Students have indicated their interest in having more robust outdoor wireless coverage through the Student Governance Council, and OIT plans to improve exterior access at all campus locations during the next two years. New facilities such as the Rockville North Parking Garage are initially being outfitted with the latest in outdoor wireless equipment.

The WiFi network has recently been enhanced to offer an authenticated and fully encrypted transmission channel in addition to the traditional open public network. This new feature is now available and will be promoted for use by anyone having a need for services which formerly required VPN (virtual private network) access.

In certain cases, especially in new campus buildings designed according to LEED ("Leadership in Energy and Environmental Design") principles, there is limited interior reception of cellular telephone signals. This can be addressed using a choice of technologies and cooperative arrangements with the cellular carriers. OIT has begun to study the cellular signal propagation characteristics in 10 selected buildings throughout

the College, and is actively pursuing ways of mitigating this problem through the use of technologies such as “small cells” and distributed-antenna systems.

Point of Presence

Each campus requires a robust and secure location to serve as the core of its network operations. This “point of presence” serves as the central termination point for all campus network cabling – fiber optic as well as copper – and brings together the routing, switching and security components of the campus data, voice, video, and sensor networks. The Germantown campus is in need of an improved facility to serve this purpose. The Science and Applied Studies building renovation project includes creation of a new area to allow for consolidation of existing cabling and network equipment into a facility having appropriate electrical and environmental capacity to support future growth and improve reliability and security.

Cooperation with Office of Facilities

OIT and the Office of Facilities have a long history of working cooperatively together on the design of new facilities and the renovation of existing facilities. The physical installation of network infrastructure such as conduit and cabling is a joint effort supported by the county-funded capital improvement projects of both offices. Building automation and security systems increasingly rely on the College network for their functionality. Looking to the future, facilities applications using the network infrastructure will expand dramatically as the “Internet of Things” (IoT) matures. The phrase Internet of Things refers to the interconnection of a wide variety of physical devices via local networks and the Internet – sensors of various kinds, actuation devices, buildings, vehicles, appliances – to enable these objects to be managed remotely and to collect and exchange data with other services, typically using a cloud-based application for integration with other systems and for data storage and analysis.

OIT will work closely with Facilities to monitor the development of the IoT and to leverage its concepts where useful. For example, emerging technologies in the area of LED (light-emitting diode) street lighting enable use of lighting poles as multi-function devices capable of supporting outdoor wireless Internet access, interaction with video and perimeter security systems, parking and traffic applications such as license plate recognition, and of course, improved and more efficient exterior lighting that can be configured to address a variety of conditions. A plan to improve exterior Internet access should address the use of IoT technology to enhance the value of the infrastructure to all College units.

TELEPHONE SERVICE

Aging campus telephone switching equipment known as Private Branch Exchanges (PBXs) are housed on each main campus, at the Mannakee Building, and each Workforce Development site. This equipment takes up space and consumes electricity, requires an extensive cable plant, and takes special expertise to maintain. This technology has become obsolete due to the merger of voice and data technologies using networks built for data transmission and using the TCP/IP protocol now universally used by computer-based technologies. Telephone systems have now become a subset of computer technology, and are designed to use the same network hardware and software applications as data systems, based on the

same technology platform. As applied to traditional telephone systems, this technology is called “VoIP” – Voice over Internet Protocol.

A VoIP system will create the opportunity to reduce the growth in telecommunication costs through use of capabilities such as “SIP trunking” (using Internet facilities to transmit telephone calls rather than traditional land lines) and acquisition of commodity hardware and software costing less than traditional proprietary PBX system equipment. It will also deliver new features such as voice mail messages delivered to e-mail inboxes, tighter integration with cell phones, integration with Microsoft directory services, and video calling and conferencing capabilities (known as “Unified Communications”). When integrated with existing systems such as Workday, this technology can also improve customer service applications for the College Response Center, WDCE, the IT Service Desk, and Facilities.

OIT will implement a cloud-based VoIP telephone system for the College in 2017. As with other cloud applications, no new hardware will be required, although telephone handsets in offices and classrooms will be replaced with new touch-screen devices. In some cases, “soft phone” software may be installed to transform existing personal computers into telephone and video conferencing devices.

SERVICE DESK

For many years, OIT has outsourced the functions of its technology Service Desk to a third-party contractor who provides problem resolution via telephone and “break/fix” hardware repair services. As technology has changed and the sophistication of our users has grown, the balance of need between telephone consultation, in-person hands-on support, and physical repair work has changed. And as part of its *OIT Lifecycle*, employees formerly assigned to specialized roles as PC technicians, audio-visual equipment technicians, and dedicated academic and administrative support roles, have been consolidated into one unified team working together and distributed across the College’s multiple locations and constituencies.

The College also operates other “call centers” to respond to student inquiries and facilities maintenance requests. The current IT support environment, the implementation of a new VoIP telephone system, and the relocation of the College Response Center staff to the Mannakee Building has created the potential to reduce operating costs and improve service by exploring new support systems and methods for providing these telephone-centric support services. OIT will evaluate available options to redesign its Service Desk service with the objective of reducing operating costs beginning in FY’18. Consideration will be given to “insourcing” the Service Desk by reassigning problem resolution via telephone on a rotating basis to appropriately trained existing IT support staff. The result could be a substantial reduction in cost and an improvement in cross-training and customer support.

DIGITAL SIGNAGE

Departments throughout the College have frequently installed flat-panel display monitors in the vicinity of their offices to help inform students and the public at large about program offerings, special events, important schedule updates, and other news items of interest. These devices are locally managed and

controlled, leading to inconsistent presentation quality and inefficient use for delivering messages and content of collegewide interest. In addition, their standalone nature prevents them from being used effectively as part of a collegewide emergency communications system.

In conjunction with the Office of Communications and Media Relations, OIT will implement a cloud-based digital signage content management system, allowing Communications to work with content contributors throughout the College to manage a more useful and feature-rich system. Local content will continue to be featured, but be presented within a template that ensures adherence to College branding standards and use of effective visual communication techniques. Existing signs will be augmented by new displays capable of being used as interactive wayfinding stations and information kiosks.

Initial deployment of the system will begin during the last half of FY'17, with expansion to approximately 100 screens in FY'18.

ONE-CARD SYSTEM

The College currently makes limited use of identification (ID) cards, and not all members of the community have been issued a card. The need for a central database of identification card information for all students, faculty and staff is evident when an ID card is considered as a security tool as well as for its use for other routine purposes. A "one-card" system allows the ID card to be used not only for identification purposes, but also for access control to buildings and offices and as a transaction card for use in libraries, at print stations, in the campus dining facilities, vending machines, etc. Some colleges and universities have even integrated their ID cards with the local transit system so that they can be used to buy bus and subway fares. In conjunction with the Office of Public Safety, Auxiliary Services, and Student Life, OIT will implement a one-card system and explore its use for a wide variety of College services.

EMERGENCY COMMUNICATIONS, COMMUNITY ENGAGEMENT, AND PUBLIC SAFETY

Being able to communicate efficiently and effectively in an emergency situation is an essential component of the College public safety mission. The College currently makes use of an emergency alert system shared with the Montgomery County government. This system provides text and e-mail alerts to subscribers in the event of an emergency, but it is not well integrated with the College's systems. More comprehensive, multi-purpose systems are available in the marketplace that combine multiple forms of messaging (text, e-mail, telephone) for use not only in emergency circumstances, but also for promotional and informational purposes related to College activities and events.

Mobile device extensions of these messaging systems are available to allow public safety officials to directly engage with students and others. For example, a panic button app that speeds up emergency response by first responders, a tip texting app that allows the public to send crime tips or general concerns to public safety, and a safety timer app that triggers a notification if it expires unexpectedly before a particular activity ends.

OIT will explore and evaluate the feasibility of adopting systems such as these in conjunction with the Office of Public Safety, the Office of Communications and Media Relations, and Student Life,

WEB CONTENT MANAGEMENT

As part of a project to redesign the College website, OIT, in partnership with the Office of Communications and Media Relations, will support implementation of a new campus-wide web content management system. Because website development is important to many offices and content creators are distributed throughout campus, use of an enterprise-wide content management system will offer a simpler method to provide distributed access to web site content while ensuring a consistent and high-quality presentation. Related to this initiative is the ongoing effort to complete migration of the entire College website to the new cloud-based technology platform used to host it, and incorporating the “look and feel” of the new site. This work also includes development of a new information architecture plan for the website and simplification of existing web content for ease of access and better audience engagement.

SHARED SERVICES

Technologies such as virtualization, cloud computing, and advanced networks enable the delivery of information technology services which leverage consolidation, standardization, and sharing of infrastructure and applications to reduce provisioning time, complexity and cost. The availability of these technologies has helped to make the pursuit of “shared services” more common within all types of organizations.

The Gartner IT research and advisory company defines a shared-service organization (SSO) as “a dedicated organizational unit (including people, processes and technologies) that is structured as a virtually centralized point of service, providing IT and/or business services. The SSO focuses on standardized services for multiple business units within the enterprise, ideally each service provided as one single instance to many clients.”¹⁶ Gartner notes that a shared-services approach “offers an opportunity to realize economies of scale and scope, develop higher levels of capability and innovation, and promote harmonization of culture and process.”¹⁷

Multiple examples of shared service arrangements can be found in colleges and universities throughout the country, perhaps most notably among academic libraries. A model of long-term cooperation and collaboration using a shared service approach is the California State University system, which shares use of a single data center for administrative applications, and common network equipment and management practices throughout the statewide 23-campus system.

Montgomery College has an immediate opportunity to explore this model by engaging more directly with the countywide Interagency Technology Policy and Coordination Committee (ITPPC), of which the College is one of six members. The ITPCC’s most recent work plan calls for an exploration of possible ways in which the county agencies can more effectively and efficiently cooperate in joint technology projects. A shared service approach to address common challenges, possibly while leveraging the College’s data

¹⁶ Shared Services: The Strategic Path Toward the Digital Future,” August 2015, Gartner, Inc.

¹⁷ “Achieving Success with Shared Services,” March 2008, Gartner, Inc.

center if useful, could present new opportunities for cost savings or cost avoidance in areas such as network management, private cloud services, technology training, general server administration, and crisis and security incident management. OIT will continue to actively promote this form of cooperation within the ITPCC.

Foundation – Information Security

OIT recognizes that information is a critical asset, and that how information is managed, controlled and protected has a significant impact on the delivery of services to students, faculty and staff and the reputation of the College. Information assets must be protected from unauthorized use, disclosure, modification, damage and loss. Additionally, information assets must be available when needed, particularly during emergencies and times of crisis.

The threat vectors to College information have morphed and elongated as users employ a wide variety of devices, from anywhere at any time, often from outside the managed College network perimeter. At one time, threats were consistently presented at the border of the College network, and firewalls repelled the attacks. The new expanding border requires playing defense against attacks on several more fronts, which requires a more holistic view of security.

The College network is constantly under attack, and users of information technology are targets on a daily basis of phishing, ransomware, malware, and other forms of criminal behavior, any of which could result in a hacker having access to significant stores of College information. Often these users have access to sensitive information resources, upping the stakes of the constant attacks. In addition to network probing, primary incursion vectors are e-mail and web attacks, both of which should be a focus of preventative measures. The task of mitigating the chance of successful attacks occurring requires implementation of defensive technical tools that can monitor, block or impede attacks and threats, inhibit incursions, and lessen the opportunities for success.

Unfortunately, College employees and students remain the largest vulnerability taken advantage of by criminals. Cybersecurity is everyone's responsibility. An increasingly enlightened user community is needed to recognize when an attack has occurred, and report incidents promptly so that the attack can be thwarted before damage is done.

Even with robust protection in place, we must still plan for intrusions. It takes only one person to trigger an incident. OIT will implement available tools and techniques to identify and react to an intrusion quickly, perform a rapid analysis, take mitigating action, and respond appropriately. OIT's Information Security and Privacy Office utilizes a methodology that establishes information security requirements based on risk assessments. Once risk is determined, mitigation controls are identified and implemented as resources and personnel are available. The controls are then monitored for effectiveness, and the process continues as periodic risk assessments are done to identify and measure residual risk.

The areas of focus described below outline a multi-year work plan for OIT's Information Security & Privacy Office.

DATA LOSS PREVENTION (DLP)

Data Loss Prevention tools implement a strategy for ensuring that end users do not store sensitive or confidential information outside the College network. They reduce the likelihood of data loss or disclosure of confidential and legally-protected data. This is becoming a more important need as College data increasingly is stored outside of the College environment, both in permitted repositories such as Microsoft Office 365 and Workday, or on less controlled platforms such as Google Docs. Implementation of DLP tools will be consistent with approved data governance policies and procedures. Examples include:

- Office 365 has capabilities that can limit information that can be attached to an email, and other cloud service providers offer similar tools
- Products which implement data governance rules can scan or monitor cloud resources such as OneDrive and Dropbox to ensure documents stored meet data governance rules
- Standalone DLP programs such as Identity Finder – currently used by OIT – can discover sensitive information stored on PCs such as social security and credit card numbers
- Tools and policies should be implemented that promote the principle of “least privilege” to reduce data exposure

NETWORK SECURITY

Initiatives supporting this area include a defense-in-depth architecture and increased security of critical College services. Many of these initiatives and supporting projects are required to be in place by federal regulations and state laws. Tools in place or planned for implementation include:

- Network firewalls and intrusion detection and prevention systems, which allow greater visibility into network threats as they occur, and have the ability to block those threats
- Computer host-based firewalls and intrusion detection and prevention systems, which allow protections to extend outside the College perimeter when devices are off-site or deployed in the cloud
- Domain Name Service protections to monitor access, which often can identify malicious websites
- Web application firewalls and URL filters, which provide detection and protection against web-based attacks and leverage vendor threat intelligence to broaden the database of malicious sites
- E-mail protections to monitor messages sent to and from College users to identify spam, malware, and malicious content
- Vulnerability assessment tools which can be used to identify systems that are exposed to exploitation
- Access controls such as two-step authentication which are effective at preventing remote hacker access to IT resources, minimizing the risks from the capture of reusable passwords or keystroke log data
- Anti-malware tools such as Symantec remain a critical element in the security tool suite, providing visibility into and protections for user and server systems analysis
- Network management and client onboarding tools can protect against unauthorized network access for both wired and wireless access control

NETWORK MONITORING

In light of the constant onslaught of threats through so many avenues, the ability to detect and react to threats or incursions quickly is critical to minimizing damage and containing compromises. Continuous monitoring is essential. Tools include:

- Log collection and analysis, which allow for centralized capture of logs from many devices that can be reviewed and monitored holistically
- Security Information and Event Management, which correlates data from multiple sources into a cogent, single tool to leverage intelligence and rules to easily elevate suspicious activity from the millions of reported daily events

USER EDUCATION

Even with the best technology in place, people will remain the weak link in security, so education is a critical component of an effective security program. Appropriate training will allow data owners and administrators to be more aware of the security risks that their information assets are vulnerable to, identify controls to reduce those risks, and understand what risks remain after any identified controls have been implemented.

While much of this is accomplished through simple messaging and incorporated training, other tools can be leveraged:

- Phishing is a primary incursion avenue and has been successfully exploited at the College. Anti-phishing programs have been effective at reducing phishing success
- Training programs are available that can be directed to users to promote understanding of a wide variety of security subjects

CRISIS AND SECURITY INCIDENT MANAGEMENT

Specialized tools and staff skill sets and experience are required to recover information assets in the event of a catastrophic event, and to investigate suspected attacks. Greater maturity in this area will enable the College to manage security events more efficiently and effectively, thereby reducing or minimizing the impact on the College. This requires acquisition of specialized toolsets (such as the Forensic Toolkit or Encase) to perform in-depth systems and network analysis and the cultivation of the unique expertise needed to use those toolsets effectively.

CYBERSECURITY INSURANCE

Cybersecurity insurance – currently provided by AON – will continue to be an important part of the College’s risk management portfolio.

Foundation – Measurement and Outcomes

FINANCIAL RESOURCES

Montgomery College is unusual when compared to other institutions due to its almost total centralization of operating and capital technology funding in OIT¹⁸. The tables below present the recent history of OIT funding. A stable capital budget has provided the College with the opportunity to sustain and grow its use of technology to a degree that would be the envy of many other institutions. However, financial challenges at both the state and county level, and College priorities increasingly focused on student success and efficient operations, make the case for a reallocation of OIT resources to support other institutional priorities while preserving our long-established dedication to maintaining current equipment and offering high quality services and support. This shift is largely made possible by implementing cloud-based technology solutions which allow for a reduction in specialized contractor staff, and a gradual reduction in positions achieved through attrition and reallocation.

Operating Budget

OIT's operating budget has declined by \$4.4 million since 2013, and is projected to decline by another \$1.4 million in FY'18. This is the result of reductions in several major expense categories:

- Staff headcount (17 positions reallocated to other College units)
- Telecommunications
- Contractor staff
- Software licenses

During the last two years, changes made to the architecture of the College telecommunications infrastructure realized substantial savings; staff headcount was reduced; contractor staff expenses were reduced; and various software licenses were eliminated or lowered. These changes were introduced while improving or maintaining service levels, and offering new capabilities and features. OIT's operating budget history since FY'13 is presented in the table below.¹⁹

¹⁸ Central IT services as a percentage of total institutional IT expenditures was reported as less than 66% at community colleges in the 2015 Campus Computing Survey conducted by The Campus Computing Project (www.campuscomputing.net).

¹⁹ OIT's budget has included the annual cost of leasing the OITB building at 15400 Calhoun Drive, which will end with the acquisition of the new Central Services building at 9221 Corporate Drive. The figures presented therefore do not include the building lease cost in order to present a valid year-to-year comparison.

OIT Operating Budget					Projected
FY'13	FY'14	FY'15	FY'16	FY'17	FY'18
\$29,525,016	\$28,236,467	\$29,114,131	\$26,934,445	\$25,109,106	\$23,709,106
Change	(\$1,288,549)	\$877,664	(\$2,179,686)	(\$1,825,339)	(\$1,400,000)
Cumulative Reduction by FY'18 Compared to FY'13 = \$5,815,910					

Capital Budget

Montgomery County fully funds the OIT capital budget. It had been stable for several years until FY'17, when it was reduced by \$6.5 million on a one-time basis to address unexpected county financial needs. The capital budget is the largest source of funding available for non-personnel College IT expenses. It is divided by the county into four individual capital improvement programs (CIP).

OIT Capital Budget					
CIP PROGRAM	FY'17	FY'18	FY'19	FY'20	FY'21
Information Technology	\$3,450,000	\$8,500,000	\$8,500,000	\$8,500,000	\$8,500,000
Network Operating Center	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Network Infrastructure and Support	\$350,000	\$1,800,000	\$1,800,000	\$1,800,000	\$1,800,000
Student Learning Support	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000	\$1,400,000
TOTAL	\$7,200,000	\$13,700,000	\$13,700,000	\$13,700,000	\$13,700,000

Current projections suggest that the need for future capital funding may exceed the established annual request. The College fully understands the likely future financial limitations faced by the county, and is committed to finding ways to limit its need for capital funding increases in the future.

One way of understanding the IT budget is in terms of how much is allocated to *run* the service, *transform* the service, or *grow* the service. If spending is intended to just “keep the lights on,” it counts as run. Spending to plan and implement transformative change, or change that supports new programs, services or other sources of value, or entirely new methods of running the institution or its programs and services,

counts as transform. An example would be implementing a new ERP system. If the spending expands capacity or increases effectiveness, it counts as grow. This would include spending to accommodate incremental improvements such as upgrading an existing application, or adding outdoor wireless coverage to the WiFi network.

The OIT budget for the period of this plan is primarily devoted to transformative initiatives, while growing capacity is a secondary emphasis.

HUMAN RESOURCES

The College employs a highly skilled and dedicated workforce of information technology professionals. Their demographics reveal several details of interest. The average age of an OIT employee is 51. The average tenure at the College is 14 years. Eleven employees have 30 or more years of service. Only four are in their 20s – the youngest is 25.

An ethnic profile of the IT workforce is presented in the table below:

	Male	Female	TOTAL
American Indian	3		3
Asian	21	7	28
Black Non-Hispanic	13	6	19
Hispanic	8	1	9
Other	1		1
White Non-Hispanic	60	27	87
Not Available	3		3
Vacant			11
TOTAL	109	41	161

As indicated above, women make up only 27% of the staff. This statistic is higher than the national average of 25%, but still suggests an area where improvement should be a goal.²⁰

The College needs to provide professional development opportunities for IT staff and management to ensure that their job skills continue to evolve in keeping with changing technological requirements and

²⁰ National Center for Women & Information Technology “By the Numbers” retrieved from https://www.ncwit.org/sites/default/files/resources/btn_03092016_web.pdf, November 2016.

the needs of the College. It is important to also cultivate the ability to work and manage in virtual teams across traditional department boundaries.

An updated classification system for IT positions would help to align the skills of current and future employees to be consistent with changes in technology and institutional direction. More flexible compensation policies and procedures are also needed to ensure that the College can recruit and retain qualified staff. The inability to hire for certain highly competitive skill sets is one reason why OIT also relies on the services of 25 contract employees to augment the College workforce.

According to a recent survey, Montgomery College employs more IT staff than at least 43 colleges and universities having larger student populations, including the five largest campuses of the California State University system, research universities such as Georgia State, Texas Tech, Drexel, and UNLV, and community colleges including Broward, Portland, El Paso, the Pima County Community College District, and the Austin Community College District.²¹ As previously noted, the College is unusual in the degree to which IT is centralized. Some of these institutions likely have IT staff distributed in other departments. Nonetheless, the total staff headcount stands out when compared to other institutions for which data is available.

As OIT's cloud first strategy matures and the skill requirements to implement and maintain new systems continue to be redefined, it is reasonable to forecast a reduction in headcount, either through attrition or reallocation of positions to other areas of the College. Indeed, during the past two years, 17 OIT positions have already been reallocated.

OIT's use of contractor personnel presents a clear opportunity for cost savings through a planned reduction in our dependency on this resource. Ideally, a more flexible personnel approach would allow some of these contractors to be moved directly into existing vacant College staff positions, having already established their qualifications for the role.

Beyond this, changes in position responsibilities and emphasis should be expected as more applications migrate to a SaaS cloud environment. Recalling OIT's vision of *making a difference*, the move to SaaS is the transition point to moving from being builders to being consultants and advocates. This shift will channel more resources into collaboration with College colleagues, emphasizing the design and discovery of solutions rather than the purchase and maintenance of legacy hardware and systems. This process has begun to be known as the *OIT Lifecycle*.

The term "lifecycle" suggests that the IT organization can expect to pass through multiple stages of change and refinement as we seek to be continually aligned with the College's current needs and priorities. It recognizes that we will continue to evolve as we adapt to the ever-changing nature of information technology, and as we refine our understanding of how to best utilize it to ensure the success of our students and colleagues.

Examples of lifecycle changes within the IT organization during the past 18 months include:

²¹ EDUCAUSE 2015 Core Data Survey, including 1,311 responses from all types of institutions.

- Defining two complementary “Deputy CIO” roles, one focused on external client relationships and the other on internal performance
- Defining new roles for “IT Campus Managers” to provide a single point of contact on each campus for all technology support services for both academic and administrative users
- Consolidating administrative aide support responsibilities to fewer positions
- Introduction of a marketing support position
- Assumption of responsibility for providing technology training for administrative staff
- Transferring academic lab support staff to Academic Affairs management
- Assuming management of the business process innovation team as part of OIT
- Dedicating a position to focus on accessible technology issues

And, as previously noted, reallocation of 17 positions to other College units to address their special needs.

MEASURES OF SCOPE

ASSET	Rockville	Germantown	Takoma Park / Silver Spring	WDCE	Other	TOTAL
Employee Computers	1,014	498	653	87	572	2,824
Instructional Computers	2,086	950	1,308	194		4,538
Employee Laptops	359	138	162	19	440	1,118
Instructional Laptops	685	677	487	150		1,999
Employee Tablets	308	113	283	42	247	993
Instructional Tablets	377	91	173			641
Employee Network Printers	191	142	112	18	134	597
Instructional Network Printers	161	69	57	13		300
Employee Local Printers	404	175	232	31	177	1,019
Instructional Local Printers	13	2	16			31
Projectors	230	130	76	15	19	470
Telephones	1,650	775	1,100	100	512	4,137

As illustrated by the table above, the College maintains a large inventory of IT assets: over 10,000 computers, 1,600 tablets, nearly 900 network printers, and thousands of other devices such as local printers, telephones, and projectors. This equipment enables the use of technology throughout the daily life of everyone at the College, but it also requires considerable staff resources to acquire, install, maintain, and eventually dispose of – especially in light of the geographic distribution of the College’s facilities. OIT’s procurement, asset management, and endpoint applications teams work together to manage this collection of resources efficiently and effectively.

Other examples of the scope of operation and workload handled by OIT appear below.

E-Mail Accounts	127,240
E-Mail Messages	12.6 million per month – 10.7 million blocked as spam
Calls to Service Desk	62,386 in 2015 / 59,731 in 2014
E-Mails to Service Desk	12,805 in 2015 / 8,596 in 2014
Network Equipment Closets	88
Network Switches	679
Network Ports	25,488
Network Firewalls	12
Wireless Access Points	1,438
Internet Links	3 from different providers, each 1 Gb
Servers (Physical)	68
Servers (Virtual)	416
Storage	104 Terabytes

Foundation – Teaching and Learning

Information technology is a key enabler of teaching and learning. We know that when IT initiatives align with academic and student success goals, the outcome can be transformational. OIT’s instructional and academic support initiatives over the next five years include new program areas as well as sustaining existing programs.

LIBRARIES

The College Libraries play an essential role in supporting the curriculum, and information technology is the primary delivery mechanism used for library services such as the catalog, electronic databases, streaming videos, e-books and e-journals. OIT and the Libraries work closely together to coordinate the provision and use of desktop computers, scanners, collaborative workstations, “one button” studios (used for simple video production), laptop and tablet computer loaners, and mobile device charging stations. In the future, some form of “makerspaces” will join the list. OIT also provides support for the various library management systems, most notably the Voyager integrated library system used to manage circulation, acquisitions and cataloging functions.

The Voyager system dates from 1999. Planning for the transition to a next-generation library system using a cloud-based architecture will take place in the next fiscal year, with implementation of a new system expected during FY’20.

Technology initiatives originating in other parts of the College will impact the Libraries during the timeline of this plan. The College identification card, which is also used as a library card, is expected to be replaced with new technology. There is also a new single sign-on user account and password management system being implemented which will affect the libraries, and the Workday system will need to be integrated with the library system for patron and financial information. Of particular significance is the newly redesigned College website, whose changes in style and functionality will drive enhancements to the library web pages as well. Lastly, the collegewide digital signage project will create an opportunity for improved messaging to patrons.

Another next-generation technology of interest is the use of radio frequency identification (RFID) tags to identify and allow monitoring of books, media and other tangible library materials. The technology currently used is labor intensive and does not allow patrons to self-check their materials in and out. If the complete collection were retagged, identifying shelved materials would be expedited by using digital readers, patron self-check units could be deployed, and staff mediated circulation functions could be streamlined using batch checkout and check-in of groups of books. The level of staff effort needed to provide circulation services would be reduced, allowing employees to enhance services to patrons without an increase in staff. Making this change would require an investment in equipment, tags for books, and significant one-time manual effort to manage the conversion.

A related need is the replacement of security gates at all library entrances and exits. The existing devices are near end of life, and replacement parts are no longer readily available. New gates would need to be compatible with RFID tags, and a transition strategy defined for the period when old and new security tags are in use. A coordinated evaluation and decision regarding security gates, RFID tags, and any related facilities alterations should be undertaken during 2017, with a target date of summer 2018 for completion.

The libraries are a natural gathering place for students and faculty, and use of technology is a routine aspect of the library experience. For that reason, OIT welcomes consideration of how IT staff and library staff can work more closely together to facilitate providing technology support on-site in each campus

library. A central location utilizing shared staff, dedicated to providing one-on-one consultation and support, would be an ideal venue if existing space can accommodate the concept. This idea would be similar to the “Genius Bar” facility available in Apple Stores.

STUDENT ACHIEVEMENT AND EQUITABLE OUTCOMES

Open Educational Resources

Providing equitable access to educational resources for students in need is an important goal of the College and OIT. Open educational resources (OERs) are books or other study materials that are provided at no cost to the student and are easily downloaded. The price of textbooks is one reason OERs are growing in popularity. A report released earlier this year by the Student Public Interest Research Groups indicates that the cost of textbooks has increased more than 73 percent in the last decade, with individual books costing as much as \$400.²²

Montgomery College has received a grant from the Achieving the Dream organization to develop Z-Degree pathways (“Zero dollars spent on textbooks”) in the General Studies program which students can complete using OERs, thereby incurring no costs for textbooks and reducing their financial burden. Additionally, the College is using internal funding grants to develop several other Z-degree pathways. Both projects fall under MC Open, an Office of E-Learning Innovation, and Teaching Excellence and Academic Affairs initiative that promotes and fosters the use of OERs.

And cost is not the only reason to use OERs. Professors like the ability to customize and modify the materials they use – and students like the ability to digitally mark up the text and take notes on the screen.

But OERs assume that students have access to PCs or other appropriate devices, as well as Internet access to download the material. OIT equips classrooms and labs throughout the College with this technology – but students studying at home or work require access when not on campus. Since OER materials are primarily electronic, unless a student opts to print copies, students without access to devices with Internet connectivity do not fully benefit, and may in fact be disadvantaged by increased OER use. Regular access to electronic devices that facilitate storing, reading, and interacting with electronic OERs will increase student success by allowing students to access instructional materials in and out of class, on and off campus, and by accommodating their individual schedules.

As part of our ongoing initiatives to increase equitable access and to promote student success, the College should determine how to equitably make appropriate devices available to students, either through long term loans or reduced cost purchases. OIT proposes to help promote use of OERs and remove any potential barriers to success by establishing a program to offer long-term loans of tablets or

²² Senack, Ethan, and Robert Donoghue, “Covering the Cost: Why We Can No Longer Afford to Ignore High Textbook Prices,” Student Organizing Inc., 2016, www.studentpirgs.org/textbooks

laptop devices to students with demonstrated need. This would include a cellular data Internet access plan for students without Internet service at home.

Achieving the Promise Academy

Similar to the proposal to support the College's participation in Achieving the Dream, the Achieving the Promise Academy (ATPA) strives to break down the digital divide for our Academy students who may be low-income or first-generation and at a disadvantage academically, socially, and financially.

Approximately one in five college students do not have access to a smartphone, tablet or laptop.²³ To eliminate this educational barrier, with OIT's support, ATPA could offer a device loaner program for its students, providing them with a tablet, smartphone or laptop, as appropriate to the determined need, including the software necessary for completing class assignments and projects.

VIRTUAL DESKTOP INFRASTRUCTURE (VDI)

Traditional personal computers continue to fill an important need for office workers and knowledge creators and will remain in service for years to come alongside complementary mobile devices.

However, in situations when the dedicated processing power or unique features available with Windows desktop computers are not a requirement, virtual desktop infrastructure (VDI) technology will be deployed to reduce the support costs and overhead associated with the acquisition, use and maintenance of individual desktop computers. This strategy is of particular value in most campus computer labs, and has already been implemented on over 100 library and lab workstations.

VDI relocates the PC experience to a centrally managed server, allowing multiple users to share secure access to a single virtual PC image while separately retaining their personal preferences and data. The usual Windows desktop is most commonly displayed using a small and inexpensive "thin-client" to which a standard display, keyboard and mouse are attached. However, the concept can be extended to any capable device with a keyboard – an old PC, an iPad – even an iPhone.

Bring Your Own Device

The standard personal computer "desktop" environment and user interface is being transformed by mobile devices such as laptop and tablet computers, iPads, Kindles, Chromebooks and smart phones. As personal ownership of popular consumer-oriented technology products becomes widespread, interest in using these devices both at home and at work is increasing. The ability to access content wirelessly and on any device is becoming an expectation held not only by the latest generation of students, but also by growing numbers of faculty and staff. To accommodate all of these devices, a virtualized application delivery infrastructure is needed.

²³ Domonell, Kristen, "Bridging the digital divide: How institutions are making tablets and laptops accessible to all students," University Business, March 2014.

OIT will therefore implement infrastructure that will enable secure use of personally chosen and purchased devices for access to College information resources. This will require development of a robust virtual application and desktop service using technology available from multiple vendors.

Although on-campus computer labs at MC can be expected to remain an important part of the technology environment provided for student use, the availability of a virtualized application environment will permit expanded access to lab applications from off-campus locations using personally-owned devices.

Over time, embracing this approach could be expected to reduce the number of College-owned personal computing devices provided to staff and faculty and installed in labs and classrooms. Under this emerging model, desktop computers (or their virtual equivalents) would continue to be provided to faculty and staff using College funds. But mobile devices – laptops, tablets, phones – could be acquired using employee funds, since these devices are increasingly, even predominantly, being used for personal purposes, and their selection reflects personal tastes and needs.

To promote adoption of this approach, the feasibility of providing a periodic stipend to faculty and staff to assist in paying for personally acquired equipment should be considered.

CLASSROOM TECHNOLOGY

All classrooms at the College are equipped with an array of instructional technology such as data projectors, computers, document cameras, and smart instructor workstations. Older mechanisms used to control this equipment will be replaced over time with easier to use touch-screen technology.

Working with Academic Affairs leadership, OIT will continually assess classroom technology needs and implement the most effective new technologies to help drive student success.

An example could be lecture capture technology which can greatly enhance the classroom experience. Next-generation learning spaces could feature audio and video capture equipment capable of recording classroom presentations for on-demand playback at a later time in multiple formats. This technology would allow students to review not only the faculty member's lecture, but also any projected slides or other electronically presented material. The ability to re-experience a classroom session multiple times can be invaluable to students for whom English is a second language, and helpful to any student faced with learning a challenging subject.

Lecture capture equipment facilitates new approaches to learning such as the "flipped classroom." Flipping a class inverts the experience – the recorded lecture is viewed at home, and classroom time is spent directly engaged with the instructor and other students.

Web-based video conferencing tools provide another means of expanding access to the classroom, taking advantage of the audio and video technology that is commonly embedded in current generation mobile devices.

The design of classroom spaces and furniture is increasingly important as well. Power sources for recharging mobile devices, screen sharing among small groups, mobile work surfaces, desks and chairs with adequate storage and work space for electronic equipment – all are elements of any next-generation classroom.

OIT will also explore ways to integrate an “e-portfolio” capability into College information systems. This is likely to be an integral component of any next-generation student ERP system,

A more exotic – but still realistic to implement – classroom technology is virtual reality simulations enabled using specialized viewing devices. As cutting-edge technologies such as virtual reality goggles prove themselves to be useful classroom tools, OIT will provide faculty with equipment and staff support to use these new capabilities.

Appendix – Goal Summary and Master Plan Alignment

Montgomery College has embraced change with the publication of its MC 2020 strategic plan. The contributions of the IT Master Plan to fulfill the aspirations of MC 2020 themes that are tracked by its performance canvas are described below.

To truly ensure student success, a strong foundation of **institutional success** is required. The following goals and strategies form the information technology roadmap to providing key services and support to the College community. These goals and strategic objectives will guide the work of the unit as we continue the deliberate move toward **making a difference** by providing technology-enabled resources that support institutional success on behalf of our students.

GOAL 1: Advance cloud strategies and technology applications that advance the use of technology in teaching and learning and support student success strategies.

MC2020 Theme I: Educational Excellence / **Theme V:** Assessment and Institutional Effectiveness

1. Connect technology and expand access to learning by partnering and collaborating with College academic and administrative units to support student success.
2. Lead the evaluation of the use of new video conferencing and lecture capture technologies within classrooms.
3. Provision transformational technology using cloud-based solutions in order to leverage resources, increase productivity, create efficiencies, and support student success.
4. Migrate data center hosted application resources to the cloud.
5. Provide reliable and resilient computing resources and capabilities in the cloud.
6. Evaluate College-sponsored options for cloud storage.
7. Limit on-site data center operations to providing only essential data and voice network infrastructure.
8. Move backup function served by the Rockville Data Center to a cloud environment as soon as practical.
9. Shift application backup and disaster recovery strategy to fully utilize the features of cloud services.
10. Evaluate alternative cloud IaaS providers.
11. Implement a cloud-based digital signage content management system.
12. Upgrade to next-generation cloud-based Library information system.

GOAL 2: Ensure fiscal stewardship and operational sustainability.

MC2020 Theme V: Assessment and Institutional Effectiveness

1. Act as a careful and thoughtful steward of significant institutional resources
2. Identify and implement cost savings and cost avoidance opportunities.
3. Review all position vacancies with an expectation of reducing or reallocating.

4. Model good fiscal stewardship of all assets including financial resources, human resources, technology, and facilities.
5. Participate in the redesign, upgrading, and construction of College facilities to ensure technology requirements are met.
6. Focus intensely on student success and institutional service by achieving organizational agility and cost-effective organizational design.
7. Evolve staff roles from a traditional development mindset to a technology consultancy and advocacy practice.
8. Reallocate and/or reduce the annual expenses associated with maintaining legacy ERP system.
9. Evaluate options that could result in revenue generation through rental of space in the data center.
10. Maintain commitment to migrating to FiberNet as the College's primary network provider, and limiting use of commercial services to an emergency backup role.
11. Evaluate available options to redesign the IT Service Desk operation with the objective of reducing operating costs.
12. Continue to actively promote shared services as a form of cooperation within the ITPCC.
13. Reallocate OIT resources to support other institutional priorities while preserving our long-established dedication to maintaining current equipment and offering high quality services and support.
14. Achieve cost savings through a planned reduction in our dependency on contractors
15. Achieve cost reductions through gradual reduction in positions achieved through attrition and reallocation.
16. Limit need for capital funding increases in the future.
17. Establish a goal of increasing the number of women employed by OIT.
18. Consider how IT staff and library staff can work more closely together to facilitate providing technology support on-site in each campus library.
19. Continue to deploy virtual desktop infrastructure (VDI) technology to reduce the support costs and overhead associated with the acquisition, use, and maintenance of individual desktop computers.
20. Implement new and enhance existing data loss prevention (DLP) tools.
21. Implement new and enhance existing network security tools.
22. Implement new and enhance existing network monitoring tools.

GOAL 3: Implement technology systems that support collegewide business processes, institutional operational efficiencies, and student success.

MC2020 Theme I: Educational Excellence / **Theme II:** Access, Affordability, and Success / **Theme IV:** Community Engagement / **Theme V:** Assessment and Institutional Effectiveness

1. Implement the first phase of Workday for Human Capital Management and Financial Management services by July 1, 2017.
2. Lead collegewide evaluation and selection of a new student information ERP system.
3. Collaborate with Advancement and Community Engagement to select and implement a new Advancement ERP system.

4. Evaluate, select, and begin phased implementation of new VoIP telephone system.
5. Establish plan to provide a secure technology environment (anywhere, anytime, and on any device) that will enable students, faculty, and staff to meet their individual information needs using tools and methods of their own choosing at a sustainable cost.
6. Update and enhance the College network, improve power reliability to network devices, update and expand wireless capabilities (including outdoor wireless).
7. Fully transition the College wide-area network to FiberNet.
8. Implement core IT infrastructure in new and renovated buildings.
9. Manage the multi-year project to replace the Banner ERP system.
10. Replace Banner as rapidly as possible to improve the experience of our students, faculty, and staff, and to enhance administrative efficiencies and reduce costs.
11. Utilize ERP replacement project to create the opportunity to redesign and improve how work is accomplished, and to promote the adoption of best practice business processes and workflow operations.
12. Analyze reporting environment to determine best option(s) to meet future reporting needs.
13. Analyze options to meet future document management needs.
14. Determine disposition of existing documents stored in ImageNow.
15. Provide continual examination of business and workflow processes throughout the College, and the potential for use of electronic signatures.
16. Produce a plan to improve exterior wireless access at all campus locations during the next two years.
17. Promote secure wireless for use by anyone having a need for services which formerly required VPN (virtual private network) access.
18. Study the cellular signal propagation characteristics in selected buildings and pursue ways of mitigating reception problems using "small cells" or distributed-antenna systems.
19. Create new network point of presence on the Germantown Campus.
20. Work closely with Facilities to monitor the development of the IoT and to leverage its concepts where useful.
21. Implement a one-card system and explore its use for a wide variety of College services.
22. Explore and evaluate the feasibility of adopting a new emergency communications system and mobile safety app.
23. Support implementation of a new campus-wide web content management system.
24. Support use of radio frequency identification (RFID) tags to identify library materials.
25. Support replacement of security gates at all library entrances and exits.
26. Propose, support, and help to promote use of OERs and remove any potential barriers to success by establishing a program to offer long-term loans of tablets or laptop devices to students with demonstrated need.
27. Establish a program to offer long-term loans of tablets or laptop devices to students with demonstrated need in the Achieving the Promise Academy.
28. Implement infrastructure to enable secure use of personally chosen and purchased devices for access to College information resources using a virtual application and desktop service.
29. Replace older audio-visual control equipment with easier to use touch-screen technology.

30. Continually assess classroom technology needs and implement the most effective new technologies to help drive student success.
31. Examine the feasibility of deploying lecture capture and web-based video conferencing technology in College classrooms.
32. Explore ways to integrate an “e-portfolio” capability into College information systems.
33. Support cutting-edge technologies, such as virtual reality goggles that prove to be useful classroom tools, and provide faculty with equipment and staff support to use these new capabilities.

GOAL 4: Recommend Policies, Procedures, and OIT Standards

MC2020 Theme V: Assessment and Institutional Effectiveness

1. Recommend policies, procedures, and OIT standards to ensure the appropriate use of technology at Montgomery College.
2. Finalize information security and data management policy and procedure.
3. Benchmark the maturity of our IT security program.
4. Increase user awareness about the importance of safeguarding and having minimal access to / retention of personally identifiable information.

GOAL 5: Enable transformation through change leadership, organizational maturity, and professional development.

MC2020 Theme V: Assessment and Institutional Effectiveness

1. Promote employee development and engagement.
2. Coordinate training and professional development to enhance and advance technology skills.
3. Establish succession paths for key positions and define career progression strategies.
4. Cultivate a performance management program as a continuous part of the operations of the OIT organization.
5. Develop agile, purpose-driven technology training courses to support end-users.
6. Elevate level of expertise of IT staff.
7. Implement best practices for high performing IT units.
8. Create avenues and mechanisms to enhance customer input.
9. Provide best possible technologies based on the College’s mission requirements.

ACADEMIC MASTER PLAN

The most recent Academic Master Plan identified seven goals and associated strategies, a new academic program review model, and six special initiatives as desired outcomes. Elements of the Academic Master Plan having direct relevance to the IT master plan include:

- Identify and implement agile software system(s) that provide real-time, easily accessible data for use by students, faculty, staff, and administrators

- Identify and implement comprehensive student success applications that facilitate and advance scheduling, planning, and recognition for progress and excellence
- Implement a portfolio system that recognizes, tracks, and validates student participation in academic programs and co-curricular activities
- Provide relevant professional development opportunities for all academic support staff in the Academic Affairs division

The first three items are addressed within the context of implementing a replacement for the Banner ERP system. The last is supported in part by OIT's role as a provider of technology training resources such as the Lynda.com video library of technical and professional development training materials.

Information technology plays an essential role in enabling the achievement of all of the strategies and outcomes described in the Academic Master Plan – and in some cases, it is the primary supporting element. But, as the Academic plan itself points out, "Study after study demonstrates that one-on-one or small-group advising, mentoring, coaching, or other personalized interventions have significant impact on students' persistence and success." Technology is an important tool – especially when it can be used to scale up services to a very large student body – but it cannot compete with the role of a faculty member or counselor who can provide the personal guidance so many students require.

SWOT ANALYSIS (STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS)

Appears on next page.

Strengths <i>What does OIT do well?</i>	Weaknesses <i>What can OIT do better?</i>	Opportunities <i>How can OIT grow?</i>	Threats <i>What will stop OIT from succeeding?</i>
<p>Has an adequate number of staff positions and the financial resources to provide high-quality technical support and services</p> <p>Provides state-of-the-art classroom and computer lab technology</p> <p>Offers multiple applications and systems to support a wide variety of instructional and administrative requirements</p> <p>Provides outstanding network and Internet access</p> <p>Utilizes mature and effective process for selection of vendors</p> <p>Technology innovation is guided by student success</p> <p>Utilizes a mature problem resolution review process</p> <p>Has well-established policies and procedures</p>	<p>Organize staff and contractor resources to enable working on a greater number of complex projects in parallel</p> <p>Identify skills gaps and respond by enhancing technical professional development of staff</p> <p>Improve communications and change management practices</p> <p>Reduce cost of technology solutions</p> <p>Reimagine IT-centric processes</p> <p>Offer new systems that provide interactive, collaborative, graphical and visual environments, and integration of data from multiple sources</p> <p>Replace antiquated and cumbersome systems faster</p>	<p>Seek innovation in IT solutions, rather than just provide IT fixes</p> <p>Move to Software as a Service applications as rapidly as possible</p> <p>Offer mobile and social-enhanced solutions for students, faculty and staff to promote operational efficiencies</p> <p>Support real-time analysis of data – predictive, operational and effectiveness analytics</p> <p>Adopt self-service features with configurable solutions</p> <p>Promote early adoption of IT technology solutions in the classroom</p>	<p>Employee skills gaps and ineffective talent management strategies</p> <p>Lack of trust – both within and outside of the organization</p> <p>Adverse change management culture – both within and outside of the organization</p> <p>Lack of flexibility and agility in adopting new technology</p> <p>Failure to anticipate the next generation of technology enhancements (robotics, biometrics, holographic learning tools, etc.)</p> <p>Declining support of software applications used within the current ERP system</p> <p>Not allocating IT resources effectively and efficiently; not rightsizing our IT resources</p>